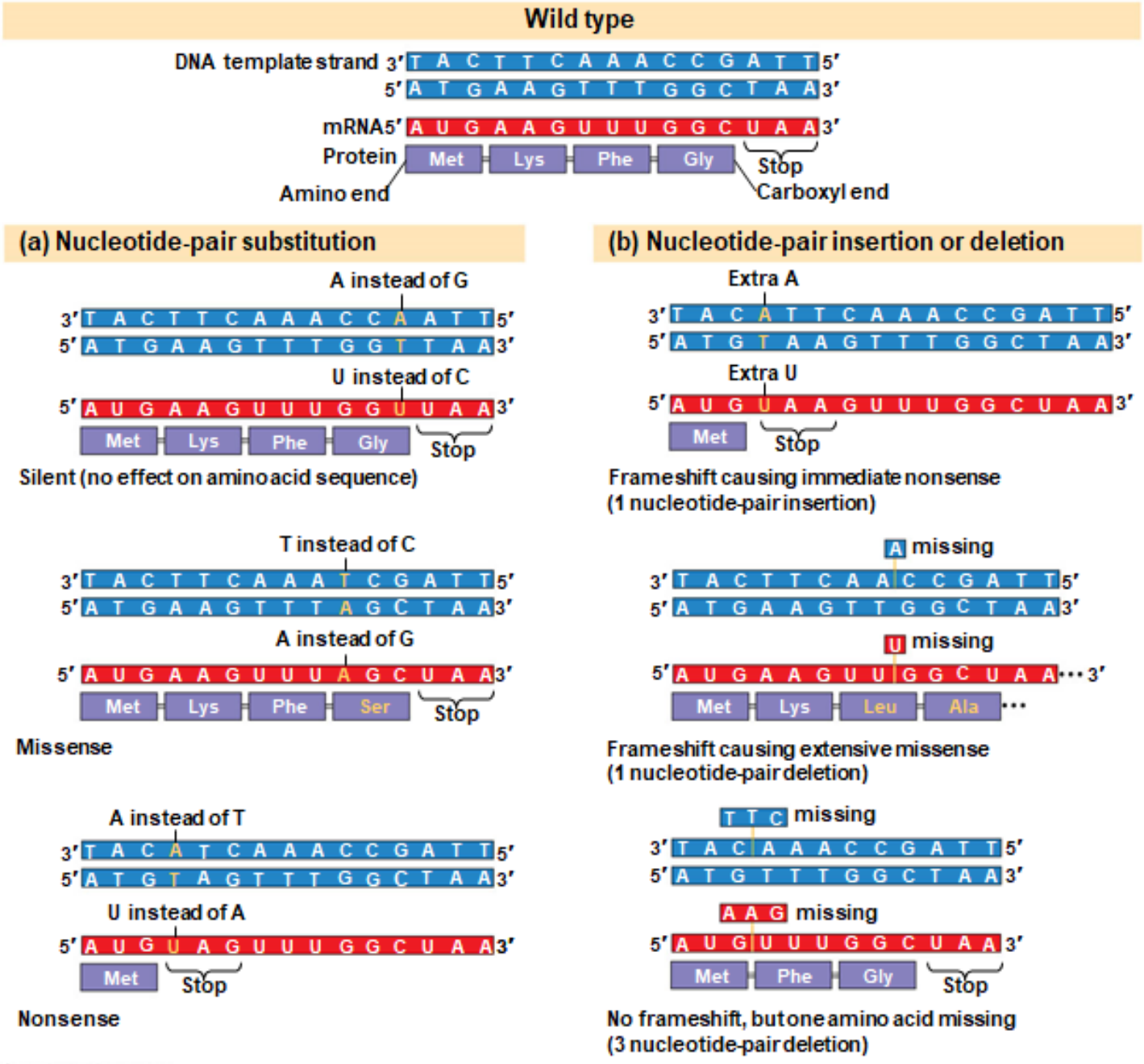
Types of Point Mutations by changing one or a few nucleotides.

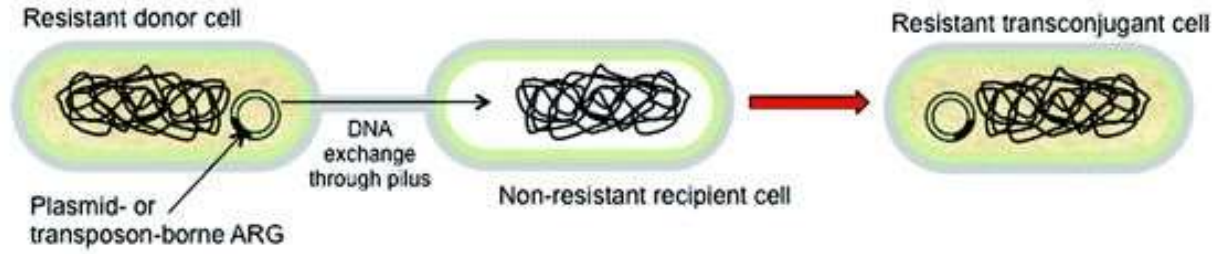


Sources of Mutations in Prokaryotes:

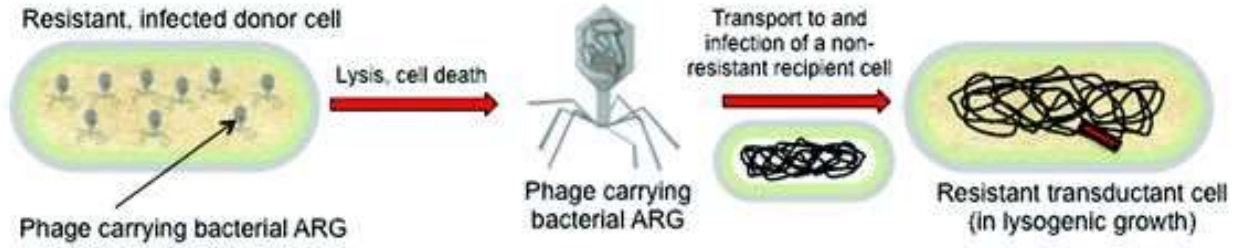
1. Natural mutations due to errors not corrected during replication, transcription or translation.

2. Diagrams below outline 3 other mechanisms:

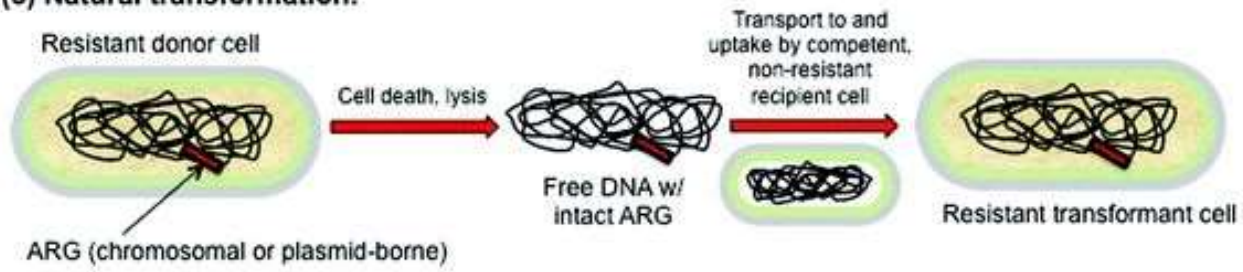
(a) Conjugation:



(b) Transduction:



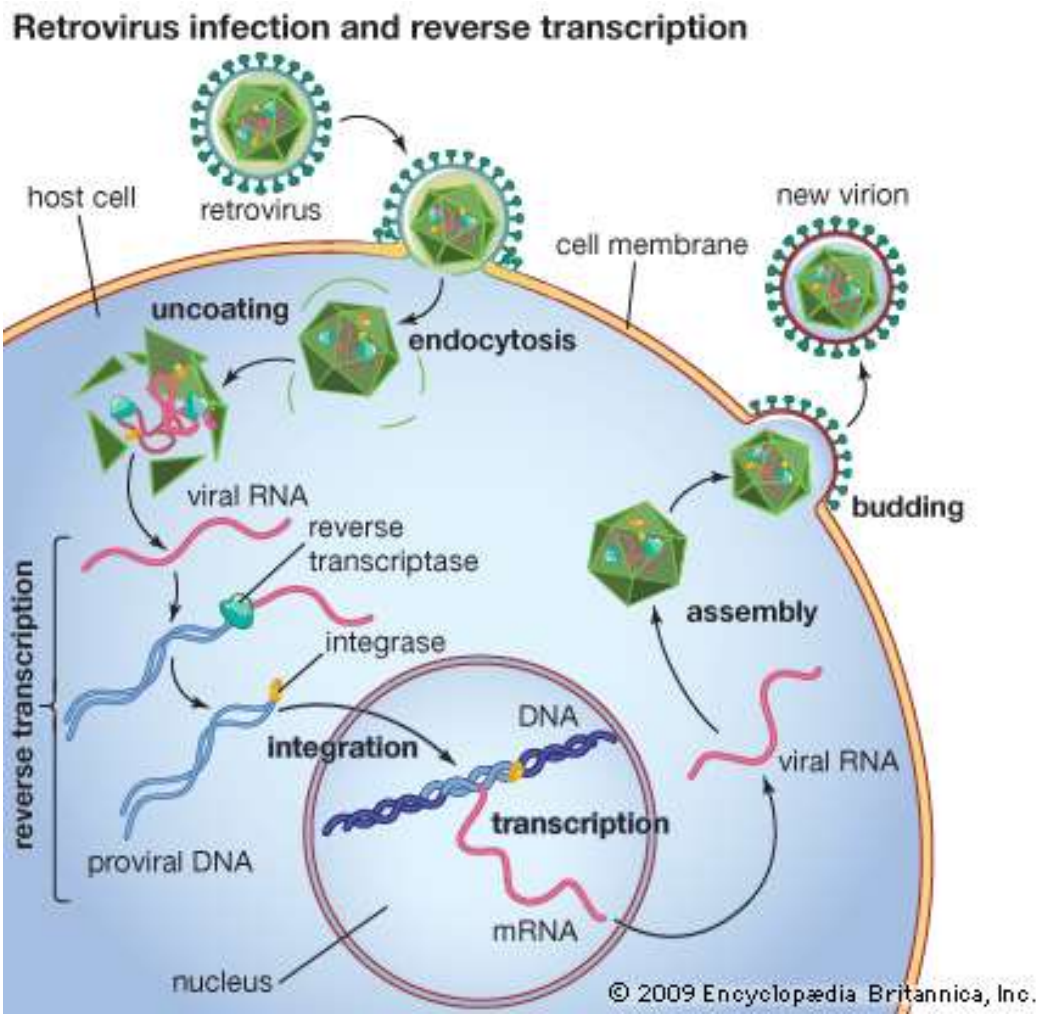
(c) Natural transformation:



Sources of mutations in Eukaryotes

1. Mutagen chemicals (pesticides, radiation, etc.)

2. Viral Transduction:



3. Transposons

4. Crossing Over & natural errors not fixed during replication, transcription or translation.

For each scenario below, propose a model that explains how the genetic change leads to the effects. Include whether it is an example of up-regulation or down-regulation.

A. People infected with the influenza virus have a much higher chance of also suffering from bacterial infections from bacteria with antibiotic resistant plasmids. These resistance plasmids activate enzymes that break down antibiotic chemicals in medicines.	**B.** A cyclin, usually inactive in adults, becomes activated upon exposure to toxins in cigarettes. The toxins are thought to cause changes in cyclin regulatory DNA, leading to a cysteine becoming glutamate that cannot properly inhibit cyclins. The result is cancer in many tissues of the respiratory tract.
C. One form of diabetes results when an insulin receptor protein is absent in cells. The cause has been identified as a single nucleotide deletion, leading the loss of 70% of the amino acids. This leads to the insulin receptor not inserting into the plasma membrane. People with this form of diabetes usually inherit it from a parent with the same genetic trait.	**D.** Bacteria with plasmids for antibiotic resistance and those without resistance plasmids coexist in nature. In hospitals, the occurrence of bacteria with antibiotic resistance is much greater than in other locations. These resistance plasmids activate enzymes that break down antibiotic chemicals in medicines.
E. A transmembrane receptor is encoded for by the DYST gene and binds calcium for a normal muscle contraction signaling pathway. People having been infected with a particular RNA virus have a much higher incidence of muscular dystrophy (MD) compared with those who have not been infected. MD leads to calcium entering muscle cells at a much lower rate than usual, leading to decreased muscle function.	**F.** Achondroplasia is a form of dwarfism that is hereditary. One of the genetic changes involves an "A" being erroneously misplaced with a "T" in the DNA coding strand, resulting in a stop codon terminating a regulatory protein prematurely. As a result, the bone construction increases drastically in too short a period, leaving the bones too large, collapsing under their own weight.